

AMENDMENTS TO THE CLAIMS

The claims have been amended as follows:

1. (Currently Amended) A control system for controlling a steering device of a ship to regulate by the heading of the ship based on a deviation of the heading from a target value thereof and control parameters, said control system comprising:

a behavior feature value detector for detecting a period of a yawing motion of the ship;
~~one of the period and the frequency of behaviors of a specific kind performed by the ship;~~

a variation calculator for calculating the amount of variations in ~~said one of the period of~~
the yawing motion of the ship based on a plurality of periods of yawing motions; and the frequency; and

a control parameter updatator for updating the value of at least one of the control parameters based on the amount of said variations.

2. (Previously Presented) The control system according to claim 1, wherein the control parameter updatator decreases the value of a proportional control coefficient which constitutes one of the control parameters according to an amplitude of the heading when the amount of said variations is smaller than a specific threshold value.

3. (Original) The control system according to claim 1 or 2, wherein the control parameter updatator increases the value of a proportional control coefficient which constitutes one of the control parameters according to the magnitude of the deviation when the amount of said variations is equal to or larger than a specific threshold value.

4. (Currently Amended) The control system according to claim 3, wherein the control parameter updatator decreases the value of a differential control coefficient which constitutes one

of the control parameters when the amount of said variations is equal to or larger than the specific threshold value.

5. (Currently Amended) The control system according to claim 1, wherein the variation calculator calculates the amount of said variations based on a standard deviation of a period of a latest yawing motion of the ship, ~~one of the periods and the frequencies of a specific number of the latest behaviors.~~

6. (Currently Amended) The control system according to claim 1, said control system further comprising:

a behavior detector for successively determining a time range of each of the behaviors of the specific kind performed by the ship based on the control parameters yawing motion of the ship;

wherein the behavior feature value detector detects said period of each of the yawing motion of the ship ~~one of the period and the frequency of the behaviors of the specific kind~~ based on the time range.

7. (Currently Amended) The control system according to claim 6, wherein the behavior detector determines timings at which the heading takes extrema as being a start timing and an end timing of the time range of each of the behaviors yawing motion of the ship.

8. (Cancelled)

9. (Currently Amended) A control method for regulating the heading of a ship based on a deviation of the heading from a target value thereof and control parameters, said control method comprising:

a behavior feature value detecting step of detecting a period of a yawing motion of the ship; one of the period and the frequency of behaviors of a specific kind performed by the ship;

a variation calculating step of calculating the amount of variations in said one of the period of the yawing motion of the ship based on a plurality of periods of yawing motions; and the frequency; and

a control parameter updating step of updating the value of at least one of the control parameters based on the amount of said variations.

10. (Currently Amended) A control state judgment device used in a control system for controlling a steering device of a ship by regulating the heading of the ship based on a deviation of a controlled quantity from a target value thereof and control parameters, said control state judgment device comprising:

a behavior feature value detector for detecting a period of a yawing motion of the ship; one of the period and the frequency of behaviors of a specific kind performed by the ship;

a variation calculator for calculating the amount of variations in said one of the period of the yawing motion of the ship based on a plurality of periods of yawing motions; and the frequency; and

a control state judgment section for determining a control state of the ship based on the amount of said variations.

11. (Currently Amended) A control state judgment method used in a control system for regulating the heading of a ship based on a deviation of a controlled quantity from a target value thereof and control parameters, said control state judgment method comprising:

a behavior feature value detecting step of detecting a period of a yawing motion of the ship; one of the period and the frequency of behaviors of a specific kind performed by the ship;

a variation calculating step of calculating the amount of variations ~~in said one of the period of the yawing motion of the ship based on a plurality of periods of yawing motions; and the frequency;~~ and

a control state judgment step of determining a control state of the ship based on the amount of said variations.

12. (New) A control system for controlling a steering device of a ship to regulate the heading of the ship based on a deviation of the heading from a target value thereof and control parameters, said control system comprising:

a behavior detector for determining timings at which the heading takes extrema as being a start timing and an end timing of a time range of each of the yawing motion of the ship;

a behavior feature value detector for detecting a period of a yawing motion of the ship based on the time range;

a variation calculator for calculating the amount of variations of the period of the yawing motion of the ship based on a plurality of periods of the yawing motions; and

a control parameter updator for updating the value of at least one of the control parameters based on the amount of said variations.

13. (New) The control system according to claim 12, wherein the variation calculator calculates the amount of said variations based on a standard deviation of periods of latest yawing motions of the ship.

14. (New) The control system according to claim 12, further comprising:

a behavior feature value memory for storing successive periods of the yawing motion of the ship;

a judgment data calculator for calculating a judgment data for each of said successive periods of the yawing motion of the ship.

15. (New) The control system according to claim 14, wherein the judgment data includes an average value of yawing areas, a maximum value of yawing areas, a root mean square of angular deviations of a center of the ship's yawing motion, and a standard deviation of yawing periods.